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June 12, 2006
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of : **Confirmation No. 8526**
Inge JOHANSEN et al. : Attorney Docket No. 2001_1826A
Serial No. 10/018,174 : Group Art Unit 1725
Filed March 12, 2002 : Examiner Kevin P. Kerns

EQUIPMENT FOR CONTINUOUS, HORIZONTAL
CASTING OF METAL

APPELLANTS' BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The following is Appellant's Brief, submitted in under the provisions of 37 C.F.R.

§ 41.37. The fee of \$500.00 required by 37 C.F.R. § 41.20 is enclosed.

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REAL PARTY IN INTEREST.

The real party in interest is NORSK HYDRO ASA, the assignee of record (Reel/Frame:012669/0083).

RELATED APPEALS AND INTERFERENCES

An appeal brief was filed in related application serial no. 10/009,690 on February 3, 2006.

STATUS OF CLAIMS

Claims 1-10, 18-20 and 23-24 are cancelled.

Claims 11-19, 21-22 and 25-30 are rejected.

The rejections of claims 11-19, 21-22 and 23-30 are being appealed. A complete copy of all of the pending claims is provided in the attached Claims Appendix.

STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection in the present application.

SUMMARY OF CLAIMED SUBJECT MATTER

A description of the subject matter of the rejected claims is presented below. All references to the specification refer to the substitute specification filed on February 17, 2004.

The subject matter of independent claim 11 is directed to horizontal continuous casting equipment for horizontal casting of metal (see Fig. 1). The equipment comprises an insulated reservoir (2) for containing liquid metal, and a mold (3) removably connected to the reservoir and defining an interior cavity. The mold includes a mold housing (8, 9), permeable wall material (12, 13) provided along an interior wall of the mold housing (see Figs. 2a and 2b). The permeable wall is arranged such that thermal transfer through the permeable wall material provides primary cooling to the metal being cast. An annular slit (16) is arranged along a circumference of the cavity for directly supplying coolant into the cavity, thereby providing secondary cooling to the metal being cast (see page 3, lines 17-19). Note that oil and/or gas can be supplied through the permeable wall material, and annuli (20) are formed between the permeable wall material and the mold housing to distribute the oil and/or gas to the permeable wall material. Also, each of the annuli is divided into a plurality of sectors by restriction members (21), and each of the sectors is supplied with oil and/or gas via separate supply channels, thereby permitting differentiation of the oil and/or gas around the circumference of the mold (see page 3, line 23 to page 4, line 4; and page 5, lines 13-20).

As recited in claim 12, the permeable wall material comprises two rings (12, 13) which are separated by means of a gasket (18; page 3, lines 20-22).

The subject matter of claim 14, particularly defines that the supply channels comprise at least one gas supply channel and at least one oil supply channel, and that the gas supply channel communicates with the respective sector at a location that is upstream relative to said oil supply channel.

The subject matter of independent claim 17 is directed to horizontal continuous casting equipment for casting of aluminum. The equipment includes an insulated reservoir (2) for containing liquid metal, and a mold (3) defining an interior cavity and being removably connected to the reservoir.

The mold comprises a mold housing (8, 9), and permeable wall material (12, 13) provided along an interior wall of the mold housing. The outer circumferential surface of the permeable wall material (see Fig. 2a) defines an annular recess such that an annulus (see Fig. 2b) is formed by the interior wall of the mold housing and the outer circumferential surface of the permeable wall material. A plurality of nozzles (16) are arranged along a circumference of the cavity for directly supplying coolant therethrough. A plurality of plugs (21) are provided in the annulus so as to form a plurality of sectors (page 5, lines 19-20). Also, a plurality of supply channels(10, 11) are formed in the mold housing such that at least one separate supply channel communicates with each of the sectors so that gas and/or oil can be separately supplied to each of the sectors. and supplied through the permeable material into the interior mold cavity so that the

supply of oil and/or gas can be varied around the circumference of the mold cavity (see page 3, line 23 to page 4, line 4; and page 5, lines 13-20).

As recited in claim 18, the permeable wall material comprises two rings (12, 13) which are separated by means of a gasket (18; page 3, lines 20-22).

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 11-19, 21, 22 and 25-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,915,455 to Kittilsen et al. (hereinafter "the Kittilsen patent") in view of U.S. Patent No. 3,556,197 to Foye (hereinafter "the Foye patent") and further in view of U.S. Patent No. 2,690,600 to Tarmann et al. (hereinafter "the Tarmann patent").

Claims 11, 17 and 25-30 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9, 11, 12, 14, 16 and 17 of copending Application No. 10/009,690 in view of the Foye patent and further in view of the Tarmann patent.

ARGUMENT

Independent claim 11 requires, *inter alia*:

permeable wall material provided along an interior wall of said mold housing so that oil and/or gas can be supplied through said permeable wall material, and annuli are formed between said permeable wall material and said mold housing to distribute the oil and/or gas to the permeable wall material, and

wherein each of said annuli is divided into a plurality of sectors by restriction members, and each of the sectors is supplied with oil and/or gas via separate supply channels, thereby permitting differentiation of the oil and/or gas around the circumference of the mold.

Independent claim 17 requires, *inter alia*:

permeable wall material provided along an interior wall of said mold housing, wherein an outer circumferential surface of said permeable wall material defines an annular recess such that an annulus is formed by the interior wall of said mold housing and the outer circumferential surface of said permeable wall material;

a plurality of plugs provided in said annulus so as to form a plurality of sectors; and

a plurality of supply channels provided in said mold housing, wherein at least one separate supply channel communicates with each of said sectors so that gas and/or oil can be separately supplied to each of said sectors and supplied through said permeable material into the interior mold cavity so that the supply of oil and/or gas can be varied around the circumference of the mold cavity.

I. Rejection of claims 11-19, 21, 22 and 25-30 under 35 U.S.C. §103(a) as being unpatentable over the Kittilsen patent in view of the Foye patent and further in view of the Tarmann patent

The Examiner's position is set forth on pages 5-10 of the Final Office Action mailed on November 14, 2005. The Examiner also presents additional comments in the Advisory Office Action mailed on March 7, 2006.

The **Kittilsen patent** discloses a mold having a primary water-cooling circuit 11 and a secondary water-cooling circuit 12. In the primary water-cooling circuit 11, water passes through the mold without directly contacting the magnesium. The water from the secondary water-cooling circuit 12 is sprayed through slots or nozzles 18 directly onto the magnesium hitting the metal at an angle of about 30-35 degrees.

The Kittilsen mold also includes an oil ring 19 having channels 20 for supplying oil to lubricant the mold. Reference numeral 21 denotes a transition ring formed of insulating porous refractory material positioned at the inlet of the mold through which a protective gas is supplied from channels or gas supply passages 22. The molten metal solidifies at the point denoted by reference numeral 25. The protective gases are supplied to the molten metal prior to solidification in order to prevent discoloration. As previously discussed, the gas does not provide any lubricating effect in the mold. Note that the oil is supplied at solidification point 25 for the purpose of lubricating the mold.

The Kittilsen patent does not disclose or suggest restricting elements between the permeable wall and an interior wall of the mold housing as required in independent claims 11 and 17. The Examiner states that the Kittilsen does not "specifically" disclose

these features. It is unclear what is meant by this statement, however there is no question that these claimed features are completely absent from the Kittilsen patent.

In particular, claim 11 requires, *inter alia*, annuli formed between said permeable wall material and said mold housing to distribute the oil and/or gas to the permeable wall material. Claim 11 further specifies that each of said annuli is divided into a plurality of sectors by restriction members, and each of the sectors is supplied with oil and/or gas via separate supply channels, thereby permitting differentiation of the oil and/or gas around the circumference of the mold.

Further, claim 17 requires, *inter alia*, an annulus formed by the interior wall of said mold housing and the outer circumferential surface of said permeable wall material, and a plurality of plugs provided in said annulus so as to form a plurality of sectors.

There is nothing in the Kittilsen patent that corresponds to the above-identified limitations of claims 11 and 17.

The **Foye patent** is applied to teach the “concept” of differentiating the supply of oil around the circumference of a mold cavity. However, in the Foye patent, this is achieved in a manner that is completely different than in the present invention, as claimed in claims 11 and 17. What Foye does teach is supplying different amounts of lubricant at an entry end of the mold (see Fig. 1). Note that the chilled mold section 12 of Foye is cooled in various ways that have nothing to do with the lubricant supplied at the entry end of the mold (see col. 2, lines 56- 60). In this respect the Foye patent is

similar to Kittilsen, which provides primary and secondary cooling, both of which have nothing to do with the lubricant delivered at the entry end of the mold.

The **Tarmann patent** discloses a vertical mold, and is also concerned with the delivery of lubricant on the inner surface of the mold. However, the Tarmann device is proposed to ensure that the lubricant is "uniformly" distributed on the inner surface of the mold (see col. 1, lines 7-15). Note that the intended purpose of the apparatus disclosed in the Tarmann patent is basically the opposite that of the Foye patent.

The Examiner contends that one of ordinary skill in the art would have selectively taken features and teachings from the various references and arrived at a structure that included all of the features recited in claims 11-19, 21, 22 and 25-30. This is in spite of the fact that none of the applied prior art references disclose the claimed structure, and the modifying references are directed to different types of molds, and are designed to achieve dissimilar results. Furthermore, all of the proposed modifications are irrelevant with respect to providing primary cooling to the metal being cast, as specified in claim 11. Clearly, the only teaching of record, which would result in the inventions defined in claims 11 and claim 17, is Applicants' own specification, which of course is an impermissible use of hindsight. For a *prima facie* case of obviousness to be established, the teachings from the prior art itself must appear to have suggested the claimed subject matter to one of ordinary skill in the art. See In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (Fed. Cir. 1976). The Examiner has not identified anything in the references themselves that would have suggested the desirability of the proposed combination.

Clearly the combination of conflicting teachings proposed by the Examiner would not have rendered obvious Appellants' invention as defined in at least claims 11 and 17.

Further, the specific structure recited in claims 12, 16, 18 and 22 recite that the permeable wall material comprises two rings which are separated by means of a gasket (sealing structure interposed between said two rings - claims 16 and 22). These claimed limitations are clearly not met by the combination proposed by the Examiner.

* * * *

Turning to the statements (numbered herein) made by the Examiner in the "Response to Arguments" section of the Office Action, Appellants respond as follows:

1. The Examiner takes the position that "the gas does not further limit the structure of these apparatus claims."

As instructed in MPEP 2143.03 all limitations in a claim must be considered when judging the patentability of that claim against the prior art. Claim 14 requires a gas supply channel communicating with a sector at a location upstream relative to the oil supply channel. This language clearly limits the structure of the apparatus claim, and is unsuggested in the prior art applied by the Examiner.

2. The Examiner take the position that:

"Foye includes such flow control means (valves) that would readily be used on the separate supplies of oil and gas taught by Kittilsen et al., resulting in

controlled ("differentiated") supplies. The Tarmann et al. reference remedies the lack of specificity set forth by Foye (valves), since Tarmann et al. disclose a plurality of plugs or similar restriction members that "differentiate" the supply of oil around the mold cavity."

Applicants concede that the oil and gas supply channels in Kittilsen could be (and likely are) provided with valves to control flow therethrough. However, the teachings of Tarmann are not applicable to the proposed Kittilsen/Foye combination for the reasons set forth above.

3. In responding to the inquiry as to the location of the claimed annuli in the Kittilsen/Foye combination, the Examiner responds as follows:

"In the 1st paragraph on page 9, the annuli are defined by a lubricating device 23 having upper and lower (sectors) chambers 18,27 (of the annuli) and adjustable valves 17,26 to control the circumferential supply of oil around the mold in the region of the plate element 11."

The reference numerals are presumably to the Foye patent, which was applied for its "concept" of differentiating lubricant around the surface of the mold. However, the chambers of the Foye system are formed by arcuate shaped depressions formed in the end face of the mold. Foye does not have an annulus as required in claim 17, and clearly does not have annuli (more than one annulus) as required in claim 11. Clearly, the Foye reference does not disclose or suggest an "annulus" formed by an annular recess in the outer circumferential surface of the permeable wall material (claim 17) or "annuli" formed between said permeable wall material and said mold housing to distribute the oil and/or gas to the permeable wall material (claim 11).

In the Advisory Action, the Examiner states that *"the annuli are defined as the regions adjacent upper and lower (sectors) chambers 18, 27 of the horizontal continuous casting apparatus of Foye, and thus this feature has been addressed."*

However, the Foye patent is applied by the Examiner to teach the "concept" of differentiating lubricant, and the Tarmann patent allegedly teaches the claimed structure. Thus, according to the Examiner, the "structure" of the Foye patent does not form any of the structure of the Kittilsen/Foye/Tarmann combination. Therefore, it is unclear how the Foye structure could be relied upon to meet the structural limitations recited in claims 11 and 17.

Furthermore, as explained above, the chambers disclosed in the Foye patent are arcuate shaped depressions formed in the end face of the mold. The ordinary meaning of the term "annulus" is a 1) ring; 2) a part, structure, or marking resembling a ring. (See for example the [Merriam-Webster Online Dictionary](#).) Clearly, the Foye arcuate-shaped depressions cannot "reasonably" be construed as forming an annulus or annuli.

4. In response to the arguments set forth on pages 9 and 10 of the response filed October 17, 2005, the Examiner states that:

"restricting elements (e.g. valves) of Foye enable the mold housing to form a "plurality of sectors". Since the applicants specifically claim a "plurality of sectors" in a physical (structural) sense in the form of "restriction members" and "a plurality of plugs", as set forth in independent claims 11 and 17, respectively, (even though the valves of Foye are deemed to divide the mold into a "plurality of sectors"), the Tarmann et al. reference provides the structural details and motivation for using the "restriction members" and "a plurality of plugs"."

As discussed in detail above, the Tarmann patent discloses structure that does not permit the oil to be differentiated (varied) around the circumference of the mold. In fact, it ensures an opposite result, i.e., uniform distribution of lubricant along the inner surface of the mold. Furthermore, Tarmann achieves this result in a vertical mold. Thus, there can be no motivation to combine the teachings of the prior art references where the individual references achieve opposite results.

To establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant. See In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998). In the present case, the Examiner has clearly failed to establish the necessary motivation.

* * * *

II. Provisional rejection of claims 11, 17 and 25-30 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9, 11, 12, 14, 16 and 17 of co-pending application no. 10/009,690 in view of Foye and further in view of Tarmann.

Initially, it is noted that the claims of co-pending application no. 10/009,690 do not recite an annulus between the permeable wall material and the interior wall of the mold housing. It is further noted that the collective teachings of the Foye patent and the Tarmann patent do not disclose or suggest an annulus between the permeable wall material and the interior wall of the mold housing.

For the reasons discussed above, it is submitted that the claims in the present application are clearly not obvious variations of the invention defined in the claims of the co-pending application. The claimed features are obvious only if the prior art references provide the teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the claimed device. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 935, 15 USPQ2d 1321, 1324 (Fed. Cir. 1990), *cert. denied*, 498 U.S. 920 (1990). Clearly, as demonstrated above, the Foye patent and the Tarmann patent do not fairly teach or suggest the modifications proposed by the Examiner.

Further, it is noted that the number of references applied in a rejection is theoretically unlimited when the references are directed to independent features of a claimed invention. However, when a reference is applied to modify a “modifying” reference (as in this case) to provide features that are not recited in the claims of the co-pending application, it is less likely that the necessary motivation exists to make such a modification. In this case, the Examiner is suggesting that Foye, as modified by Tarmann, would result in the claimed invention even though the respective structures disclosed therein produce opposite results. Clearly, the present claims are not merely obvious variations of the claims in the co-pending application, and thus the obviousness-type double patenting rejections must be reversed.

CONCLUSION

For the reasons set forth above, it is submitted that the combination of the Kittilsen patent, the Foye patent, and the Tarmann patent, as proposed by the Examiner, is not a proper basis for a rejection of at least independent claims 11 and 17. Therefore, the Examiner's decision to finally reject claims 11-19, 21, 22 and 25-30 should be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

11. Horizontal continuous casting equipment for horizontal casting of metal, said equipment comprising an insulated reservoir for containing liquid metal, and a mold removably connected to said reservoir and defining an interior cavity, said mold comprising:

a mold housing;

permeable wall material provided along an interior wall of said mold housing, wherein thermal transfer through said permeable wall material provides primary cooling to the metal being cast;

at least one annular slit arranged along a circumference of the cavity for directly supplying coolant into the cavity, thereby providing secondary cooling to the metal being cast;

wherein oil and/or gas can be supplied through said permeable wall material, and annuli are formed between said permeable wall material and said mold housing to distribute the oil and/or gas to the permeable wall material, and

wherein each of said annuli is divided into a plurality of sectors by restriction members, and each of the sectors is supplied with oil and/or gas via separate supply channels, thereby permitting differentiation of the oil and/or gas around the circumference of the mold.

12. The equipment as claimed in claim 11, wherein said permeable wall material comprises two rings which are separated by means of a gasket.

13. The equipment as claimed in claim 11, wherein said plurality of sectors comprises an upper sector and a lower sector.

14. The equipment as claimed in claim 11, wherein said supply channels comprise at least one gas supply channel and at least one oil supply channel, and said

gas supply channel communicates with said respective sector at a location that is upstream relative to said oil supply channel.

15. The equipment as claimed in claim 11, wherein a gas evacuation passage is provided in an upper part of said mold in order to permit evacuation of excess gas from the mold cavity.

16. The equipment as claimed in claim 11, wherein said permeable wall material comprises two rings and a sealing structure interposed between said two rings.

17. Horizontal continuous casting equipment for casting of aluminum, said equipment comprising an insulated reservoir for containing liquid metal, and a mold defining an interior cavity and being removably connected to said reservoir, said mold comprising:

- a mold housing;

- permeable wall material provided along an interior wall of said mold housing, wherein an outer circumferential surface of said permeable wall material defines an annular recess such that an annulus is formed by the interior wall of said mold housing and the outer circumferential surface of said permeable wall material;

- a plurality of nozzles arranged along a circumference of the cavity for directly supplying coolant therethrough;

- a plurality of plugs provided in said annulus so as to form a plurality of sectors; and

- a plurality of supply channels provided in said mold housing, wherein at least one separate supply channel communicates with each of said sectors so that gas and/or oil can be separately supplied to each of said sectors and supplied through said permeable material into the interior mold cavity so that the supply of oil and/or gas can be varied around the circumference of the mold cavity.

18. The equipment as claimed in claim 17, wherein said permeable wall material comprises two rings which are separated by means of a gasket.

19. The equipment as claimed in claim 17, wherein said plurality of sectors comprises an upper sector and a lower sector.

21. The equipment as claimed in claim 17, wherein a gas evacuation passage is provided in an upper part of said mold in order to permit evacuation of excess gas from the mold cavity.

22. The equipment as claimed in claim 17, wherein said permeable wall material comprises two rings and a sealing structure interposed between said two rings.

25. The equipment as claimed in claim 11, wherein said mold housing is formed of steel.

26. The equipment as claimed in claim 17, wherein said mold housing is formed of steel.

27. The equipment as claimed in claim 11, wherein said mold housing comprises first and second parts, and said first part of said mold housing surrounds said permeable wall material, and a thermally insulating annular plate is disposed against said first part of said mold housing to reduce thermal transfer to the mold cavity.

28. The equipment as claimed in claim 17, wherein said mold housing comprises first and second parts, and said first part of said mold housing surrounds said permeable wall material, and a thermally insulating annular plate is disposed against said first part of said mold housing to reduce thermal transfer to the mold cavity.

29. The equipment as claimed in claim 11, wherein the gas and oil, which is supplied to said sectors and around the circumference of the mold cavity, lubricate the mold.

30. The equipment as claimed in claim 17, wherein the gas and oil, supplied to the interior mold cavity, are provided to lubricate the mold.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

No decision has been rendered by the Board in the proceeding identified in the related appeals and interferences on page 2 of the present Appeal Brief.



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Inge JOHANSEN et al. : Atty Docket No. 2001_1826A
Serial No. 10/018,174 : Group Art Unit 1725
Filed March 12, 2002 : Examiner Kevin P. Kerns
EQUIPMENT FOR CONTINUOUS
HORIZONTAL CASTING OF METAL :

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Respectfully submitted,

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